

FUEL MANAGEMENT SERVICES, INC.

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New Fuel Impacts

We are transitioning to a variety of new fuels that are delivering wonderful benefits to our customers. Along with those benefits there are some negative issues that once understood can be minimized. Let's look at each of the new fuels, Ultra Low Sulfur Diesel, Low sulfur diesel, and the bio blends.

Low Sulfur Diesel /500PPM/ LSD/NRLM

You may say, Ed, low sulfur diesel (500-PPM S) has been with us since 1993. LSD is not a new fuel. We are now moving it into the NRLM markets so it is new to the delivery systems that serve those markets. We need to remember the lessons we learned from 1993 as we make this change. Something that is common to all of our fuels is that in storage our fuels build up films that adhere to the walls of their storage vessels. These films are insoluble gums generated by the fuel. In addition sediment layers build up over time and remain somewhat undisturbed unless they are exposed to unusual delivery speeds or fuels of a different/higher degree of solvency. 500 PPM fuel is slightly lighter than #2 FO and has a higher degree of solvency than #2 FO. So what? The result is a good chance that the build up of films and sediment layers will dissolve, releasing insolubles into the fuel that will wind up in strainers and filters. The end result may be no more than an additional filter change or two. That depends on the degree of sediment in the storage and delivery systems. Our recommendation is to try to start with as clean a tank as possible and or use a good additive package with significant organic dispersant to ease the transition. Realize that the tank is not the only part of the fuel delivery system. All of the fuel-wetted components of the fuel delivery system from the terminal to the engine that consumes the fuel will be impacted by this change in solvency.

In 1993 we also had to worry about seal shrinkage, especially in injector pumps. We should not have too many issues here as engine manufacturers have upgraded most seals in engines including NRLM equipment. However, remembering that seal leakage in older equipment is possible can save a lot of time trying to understand what is happening. Some of your customers may want to check with their equipment manufacturers to find out if their equipment is 500 ready before problems arise.

Ultra Low Sulfur Diesel/ 15PPM/ULSD

We now have about a year of experience with ULSD here in the US. We expected that there would be some differences relative to LSD and there are. The issues haven't been too dramatic but as usage widens we are seeing the following characteristics result in some problems. ULSD is approximately 1% lighter than LSD. We have a solvency issue with ULSD following LSD into the tank as we do with LSD following #2 FO. We need to make sure tanks are clean or ULSD will clean them out for us. The hydroprocessing that feedstocks go through to make ULSD results in a fuel that is both less lubricating and less conductive. Both of these characteristics are corrected at the end of the pipeline terminal or at the receiving marine terminal. ULSD is being treated with lubricity additives to achieve a minimum level of lubricity by ASTM D975. Some of the additives used to accomplish this are oil derivatives of a certain type of tree. These products in the presence of water can form insoluble salts or soaps that can foul filters usually combining with other insoluble gums during the transition period from LSD to ULSD. You may want to check with the terminals that you pick up fuel from and find out if they are using a lubricity improver that is synthetic or natural organic. This is a case where the synthetic should be the product of choice. If customers would like to enhance the lubricity of ULSD as most terminals are meeting minimally accepted levels, there are after market products available to do the job from companies like mine.

At approximately 1% lighter ULSD results in less power and mileage versus LSD. We will have less cancer and lung disease, but we won't be able to go as far on a gallon of fuel. Cetane improvers will not replace the lost BTUs by the way, so save your money.

Although ULSD may look like k-1 kerosene and is approaching kerosene in specific gravity it does not act like kerosene in terms of cold flow performance. ULSD due to the chemical changes that take place during the desulfurization process actually has more wax content than LSD. So far the results are inconsistent. When ULSD reaches its cloud point it has been generating more wax in a shorter temperature range than LSD. It has also been more difficult to move the CFPP of ULSD. In other words with those fuels that have a higher than acceptable CFPP, we have had to use much more cold flow improver or kerosene to provide the desired result. The recommendation here is to do more batch testing than you have done in the past to minimize any performance surprises.

ULSD is also turning out to be somewhat less stable than LSD. The move to LSD saw an improvement in stability. Stability is the potential to produce insoluble particulate. Unfortunately ULSD is less stable than LSD. The longer fuel is stored the more stability is desired. Stability is also a characteristic that can be improved with proper additization.

Bio-Fuels

The grass roots demand for bio-fuels is great. At B2-B5 there have been few problems in any market including over the road use and heating fuels. As the percent of the blend goes higher however we have seen the following issues.

Bio fuels are excellent solvents. Have we discussed this already? Especially when blended with ULSD we have an efficient solvent package that will clean out tanks and lines. Once again clean tanks and lines and an effective organic dispersant will go a long way to minimizing fuel metering system fouling by insoluble particulate released by this new fuel.

End users may want to check with their engine manufacturers prior to using bio-fuels to assure compatibility with seals and other elastomer based fuel metering system components.

The most significant concern is the impact of cold weather on bio-fuels. Bio-diesel has a higher pour point than diesel and heating oil. Again especially in most Virginia markets bio-heat at 2-5% bio-diesel will not be much of an issue. As the percentage of bio-diesel increases so does the pour point, CFPP, and cloud points of the blend. Testing your fuels for cold weather operability is one way to minimize surprises. If your fuels test at higher pours, clouds or CFPP than you require, they can be treated to bring them into range. Obviously as we pointed out earlier ULSD has some cold flow issues of its own. When blended with bio-diesel cold flow issues increase. Better to test than to be sorry.

In summary:

1. All of the new fuels have a higher degree of solvency than their predecessors.
2. Clean tanks and lines minimize particulate issues due to the increased solvency of a new fuel introduced into a tank.
3. Organic dispersants can also be utilized to minimize operational failure due to particulate.
4. Lubricity & conductivity improvers are added to ULSD at the rack in order to meet ASTM standards.
5. There are after market products available to further boost lubricity.
6. Cold flow issues with ULSD and bio-blends can be tested for prior to use and treated as required.